

IN THE CLAIMS:

The text of all pending claims, (including withdrawn claims) is set forth below. Cancelled and not entered claims are indicated with claim number and status only. The claims as listed below show added text with underlining and deleted text with ~~strikethrough~~. The status of each claim is indicated with one of (original), (currently amended), (cancelled), (withdrawn), (new), (previously presented), or (not entered). Please AMEND claims 1-5, 7-11, 14, 16, 17, and 19-21 and add new claims 22-24 in accordance with the following:

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1. (currently amended) A pattern segmentation apparatus, comprising:
a feature amount extraction unit extracting a feature amount of an image;
a feature amount setting unit setting a feature amount of a category;
a feature amount comparison unit comparing the feature amount of the category with the feature amount of the image; and
a segmentation unit segmenting an area similar a portion corresponding to the feature amount of the category from the image based on the comparison result.
 2. (currently amended) The apparatus according to claim 1, wherein
said feature amount comparison unit comprises a correspondence generation unit generating correspondence relationships between the feature amount of the category and the feature amount of the image, and compares the feature amount of the category with the feature amount of the image based on the correspondence relationships.
 3. (currently amended) The apparatus according to claim 2, wherein
said feature amount comparison unit comprises:
a difference level computation unit computing ~~comparing~~ a difference in level between the feature amount of the category and the feature amount of the image, which are related by ~~corresponding to the correspondence~~ relationships; and
an optimum correspondence extraction unit ~~extracting optimum correspondence~~ relationships each of which indicating a lowest difference level from the correspondence relationships, wherein
said segmentation unit segments ~~a portion~~ an area corresponding to positions in which ~~indicating a the difference level corresponding to of the optimum correspondence relationship is~~ equal to or lower than a predetermined value from the image.

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4. (currently amended) The apparatus according to claim 3, further comprising:
a combination unit generating a combination of segmentation areas that are segmented from the image in such a way that areas similar to a feature amount of any categories may be adjacently connected to each other on the image ~~by said segmentation unit such that each pattern segmented by said segmentation unit can correspond to any category to be recognized;~~
and

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a segmentation area determination unit determining a segmentation area of the image by prioritizing a combination in which a value obtained by accumulating each difference level for the corresponding category in each segmentation area of the combination of segmentation area is the smaller of the combinations ~~indicating a smaller difference level accumulation value in the combinations.~~

5. (currently amended) A pattern segmentation apparatus, comprising:
a feature amount extraction unit extracting a feature amount of a character string image as a sequence of elements in a character string array direction;
a feature amount setting unit setting a feature amount of a category as a sequence of elements in a category array direction;
a ~~correspondence-relating~~ unit corresponding-relating a last element of in the sequence of the elements of the category with to each of the sequence of elements of the character string image and relating each element linked to the last of the sequence of elements of the category to the element related to the last of the sequence of elements of the category or any element linked to the element related to the last of the sequence of elements of the category;
a search unit searching for an element of the character string image ~~corresponding relating to a the~~ first element of the sequence of the elements of the category in each of the sequence of elements of the image, to which ~~by allowing an sequence of remaining elements of the category with the element of the character string image for correspondence of the last element in of the sequence of the elements of the category is related;~~
a difference level computation unit computing a difference level in a feature amount between the character string image and the category, whose sequence of elements are related ~~corresponding to each other in the sequence of the elements;~~ and
a discrimination unit discriminating a segmentation position of a character from the character string image based on the difference level.

6. (original) The apparatus according to claim 5, wherein said difference level is obtained from an accumulation result of a distance between elements from the first element to the last element in the sequence of the elements of the category.

7. (currently amended) The apparatus according to claim 6, wherein said search unit makes a correspondence relationship of a current element in the correspondence relationship of past elements based on the correspondence relationship indicating the smallest accumulation value of the distance between elements.

8. (currently amended) The apparatus according to claim 5, further comprising:
an entry unit entering a set of a searched ~~an~~ element of the character string image that is related to ~~corresponding to~~ the first element of the sequence of the elements of the category and a corresponding difference level for each category to be recognized, for each of the sequence of elements of the image which is related to the last of the sequence of elements of the category ~~all elements in the character string image array direction~~;

a search unit ~~detecting~~ searching for a difference level whose value is ~~indicating a value~~ equal to or smaller than a predetermined value of ~~in~~ difference levels specified by each an element corresponding to the segmentation position of the character string image;

an ~~obtaining~~ acquisition unit obtaining the element of the character string image corresponding to the difference level ~~retrieved~~ searched for by said search unit, from said entry unit; and

a computation unit computing a ~~next~~ subsequent segmentation position of the character string image based on the element of the character string image obtained by ~~from~~ said entry unit.

9. (currently amended) The apparatus according to claim 8, further comprising:
a path generation unit generating a path connecting the segmentation position of the character string image with the next segmentation position of the character string image computed by said computation unit;

an attribute assignment unit assigning a coordinate of the segmentation position, the difference level ~~retrieved~~ searched for by said search unit, and

the category corresponding to the difference level as attributes of the path;
 a combination generation unit generating a combination of the paths by trading the character string image through the path;
 an evaluation unit evaluating the combination of the paths based on an accumulation result of a difference level assigned to the path;
 a selection unit selecting a combination of the paths based on the evaluation result; and
 a section point determination unit determining a coordinate assigned to a path selected by said selection unit as a section point of the character string image.

10. (currently amended) The apparatus according to claim 9, further comprising a recognition result output unit ~~defining~~ determining a category assigned to a path selected by said selection unit as a recognition result of aan area in the character string image segmented in the segmentation position ~~pattern sectioned at the section point~~.

11. (currently amended) A method of segmenting a pattern, comprising:
 setting a feature amount of a category;
~~extracting a searching for an area corresponding to the feature amount of the category in~~
 an image; and
generating an arbitrary correspondence relationship between the feature amount of the category and the feature of the image;
comparing the feature amount of the category with the feature amount of the image based on the correspondence relationship; and
 segmenting an area similar to the feature amount of the category obtained in the searching process from the image based on the comparison result.

12. (original) The method according to claim 11, wherein said feature amount of the category is compared with the entire feature amount of the image in a continuous DP method.

13. (original) The method according to claim 11, wherein said feature amount is peripheral features up to an n-th ($n \geq 1$) peripheral feature.

14. (currently amended) The method according to claim 11, wherein:

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of all combinations of segmentation positions in which segment areas similar to a feature amount of any of the categories in such a way as to being adjacently connected on the image, a combination whose sum of a difference level between the image segmented in each segmentation position and the category similar to the image is a minimum is selected~~every pattern segmented from the image are associated with any of the categories to be recognized;~~

~~a combination of a category to be recognized and
a corresponding pattern indicating a lowest total difference level is selected;~~

15. (original) A method of segmenting a pattern, comprising:

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segmenting a first segmentation area corresponding to a feature amount of a category from an image; and

changing the first segmentation area when a second segmentation area cannot be segmented corresponding to a feature amount of a category from remaining areas of the image.

16. (currently amended) A character segmenting method, comprising:

extracting a feature amount of a character string image as a sequence of elements in a character string array direction;

setting a feature amount of a category as a sequence of elements in a category array direction;

~~independently scanning a first element and a last elements in a~~ of the sequence of elements of the category independently of against the sequence of the elements of the character string image;

~~obtaining computing a correspondence relationship between the sequence of the elements of the category and the sequence of the elements of the character string image based on the scanning;~~

computing a difference level in a feature amount between the character string image ~~corresponding to the correspondence~~ and the category, which are related to each other by the correspondence relationship; and

~~discriminating determining in what area of whether or not a pattern corresponding to the category exists in the character string image~~ a feature amount similar to the feature amount of the category exists, based on the difference level.

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17. (currently amended) A pattern recognizing method, comprising:
setting a feature amount of a category;
extracting a feature amount of an image;
generating an arbitrary correspondence relationship between the feature amount of the
category and the feature amount of the image;
comparing the feature amount of the category with the feature amount of the image
based on the correspondence relationship;
segmenting an area similar to the feature amount of the category from the image based
on the comparison result
~~searching for an area corresponding to the feature amount of the category in an image;~~
~~segmenting an area obtained in the searching process from the image; and~~
~~determining setting a the category used in for the segmenting process segmentation as a~~
recognition result of an the area segmented from the image.

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18. (withdrawn) A pattern recognizing method, comprising
setting a feature amount for segmenting a category;
setting a feature amount for recognition of a category;
segmenting a pattern from an image based on the feature amount for segmentation; and
recognizing a pattern segmented from the image based on the feature amount for
recognition.

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19. (currently amended) A computer-readable storage medium storing a program for
~~realizing~~executing at least:
setting a feature amount of a category;
extracting a feature amount of an image;
generating an arbitrary correspondence relationship between the feature amount of the
category and the feature amount of the image;
comparing the feature amount of the category with the feature amount of the image
based on the correspondence relationship; and
segmenting an area similar to the feature amount of the category from the image based
on the comparison result

searching a pattern corresponding to the feature amount of the category from an image;
and
segmenting a pattern obtained in the searching process from the image.

20. (currently amended) A pattern segmentation apparatus, comprising:
feature amount extraction means for extracting a feature amount of an image;
feature amount setting means for setting a feature amount of a category;
feature amount comparison means for comparing the feature amount of the category
with the feature amount of the image; and
segmentation means for segmenting a portion corresponding to the feature amount of
the category from the image based on the comparison result.

21. (currently amended) ~~An~~ A pattern segmentation apparatus, comprising:
feature amount extraction means for extracting a feature amount of a character string
image as a sequence of elements in a character string array direction;
feature amount setting means for setting a feature amount of a category as a sequence
of elements in a category array direction;
relating means for relating a last element of the sequence of the elements of the
category to each of the sequence of elements of the character string image, and relating each
element linked to the last of the sequence of elements of the category to the element related to
the last of the sequence of elements of the category or any element linked to the element related
to the last of the sequence of elements of the category;

~~correspondence means for corresponding a last element in the sequence of the
elements of the category with each element of the character string image;~~

~~search means for searching for an element of the character string image corresponding
related to a first element of the sequence of the elements of the category by allowing an in each
of the sequence of remaining elements of the category with the element of the character string
image for correspondence of the last element in to which the last of the sequence of the
elements of the category is related;~~

~~difference level computation means for computing a difference level in a feature amount
between the character string image and the category corresponding whose sequence of
elements are related to each other in the sequence of the elements; and~~

discrimination means for discriminating a segmentation position of a character from the character string image based on the difference level.

22. (New) An pattern segmentation apparatus, comprising:

- a feature amount extraction unit extracting a feature amount of a character string image as a sequence of elements in a character string array direction;
- a feature amount setting unit setting a feature amount of a category in a category array direction;
- a correspondence unit corresponding a last element in the sequence of the elements of the category with each element of the character string image;
- a search unit searching for an element of the character string image relating to a first element of the sequence of elements of the category in each of the sequence of elements of the image to which the last of the sequence of the elements of the category is related;
- a difference level computation unit computing a difference level between the character string image and the category corresponding to each other in the sequence of the elements;
- a discrimination unit discriminating a segmentation position of a character from the character string image based on the difference level;
- an entry unit entering a set of an element of the character string image corresponding to the first element of the sequence of the elements of the category and a corresponding difference level for all elements in the character string image array direction;
- a search unit detecting a difference level indicating a value equal to or smaller than a predetermined value in difference levels specified by each element corresponding to the segmentation position of the character string image;
- an obtaining unit obtaining the element of the character string image corresponding to the difference level retrieved by said search unit from said entry unit;
- a computation unit computing a next segmentation position of the character string image based on the element of the character string image obtained from said entry unit;
- a path generation unit generating a path connecting the segmentation position of the character string image with the next segmentation position of the character string image computed by said computation unit;
- an attribute assignment unit assigning a coordinate of the segmentation position, the difference level searched for by said search unit, and
- the category corresponding to the difference level as attributes of the path;

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a combination generation unit generating a combination of the paths by trading the character string image through the path;

an evaluation unit evaluating the combination of the paths based on an accumulation result of a difference level assigned to the path;

a selection unit selecting a combination of the paths based on the evaluation result; and

a section point determination unit determining a coordinate assigned to a path selected by said selection unit as a section point of the character string image.

23. (New) The apparatus according to claim 22, further comprising
a recognition result output unit defining a category assigned to a path selected by said selection unit as a recognition result of a pattern sectioned at the section point.

24. (New) A pattern segmentation process, comprising:
storing a character feature size for features to be extracted from a character string image;
scanning the character string image and extracting image feature sizes of features in the character string image;
comparing the character feature sizes to the image feature sizes and determining best matches between character feature sizes and image feature sizes; and
segmenting the character string image based on the best matches.